

E-1

UNITED STATES
DEPARTMENT OF THE INTERIOR

DI-6

APPROVED DECEMBER 1941

Eniwetok

Book

3

E-1

Samples to Cole

A - top foot	} #1	} sent 7/5/52
B - 18" from bottom		
C - 2805	} #2	
D - 2807		

Notes on cores -

#1 - 2003 - 2028 - p. 150, 16
2 - 2802 - 2808 - p. 21
3 - 4078 - 4100 - p. 29
4 - 4208 - 4211 - p. 35-37
5 - 4211 - 4216 } pp. 38-41
6 - 4216 - 4222 }

Notes on cuttings

p. 3, 7, 17, 25, 31

Book 3

1952

E-1 Eniwetok - Site Elmek

June 24 ~ Tues - 8AM - 4PM - Leda

Book 3

1952

E-1 Eniwetok - Site Elmer

June 24 ~ Tues - 8AM - 4PM - Ladd

Spudded in 10 AM

0-10 - No sample; all measurements
from top of rotary table = 19.11'
above MLWS.

10-20 - 1 sack

20-30 - 1 "

30-35 - 2 "

35-40 - 2 "

40-45 - 2 "

Samplers caught in trough,
using chain as dam,
clearing out trough each
time. Hard rock
18-21' - probably beach
rock belt - intertidal.
- see sample of coral

12:00 - making connection after washing
out hole, stirring up mud and
adding fiber to

45-74

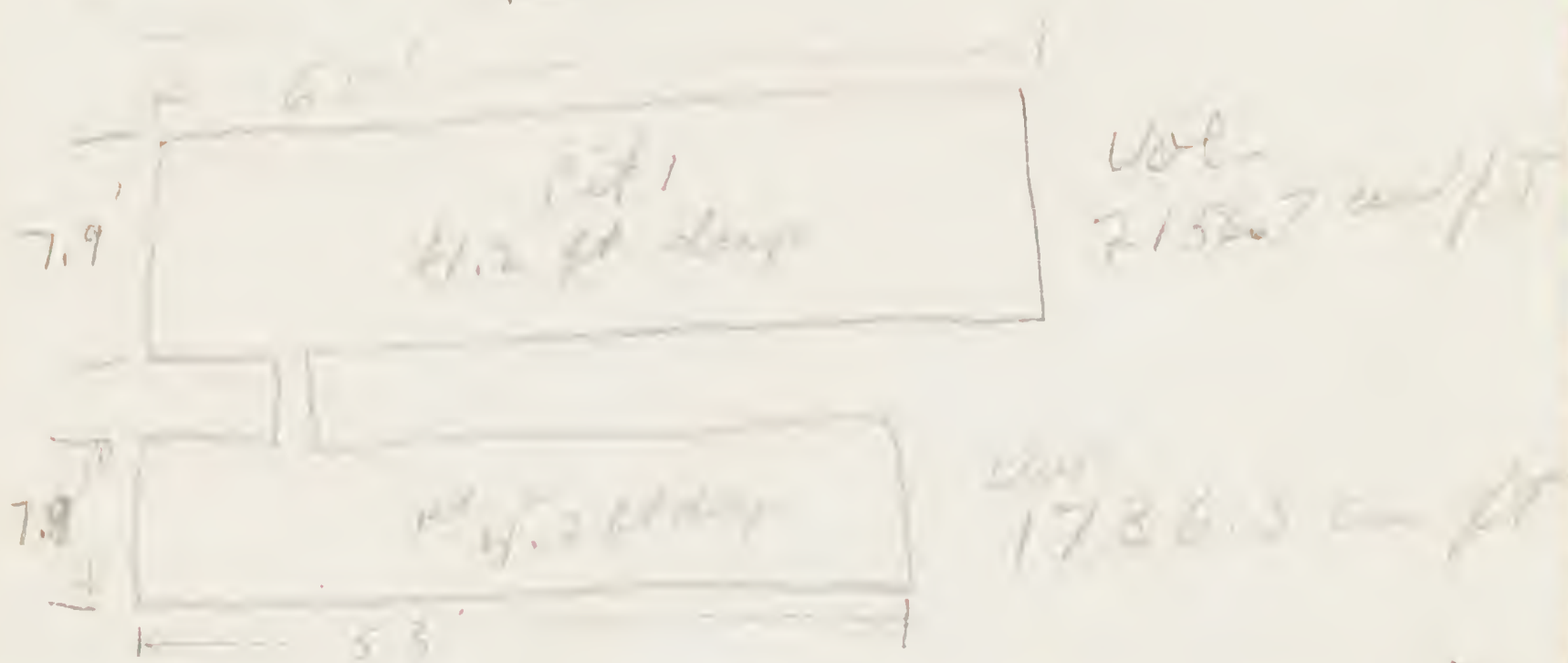
74'-82' Driller says rock is wet.

No drilling time record
made as yet. Springer to
get a pencil & record with
the depth for 10-ft intervals.

E-1

Samples to Cole

Capacity of gravel pits



Total Vol of pits [7.48 gals per cu ft.]

~~3892~~ cu ft

Cap. of pits - 29,190 gals.

- Hard 85-86'

- drilled to 130'; nearly stuck in hole on

-Hard 85-86'

-drilled to 130'; nearly stuck in hole in attempting to make connection;

-on to ~~145~~₁₄₆ - pulled out to ream.
Totco $\frac{1}{2}^{\circ}$

June 25 ~ Wed.

Finished reaming 4³⁰ AM; circulated and built up mud to viscosity 42 (added 16 sacks Aquagel and 2 of lime) - heavy cuttings coming out at 6:30 -

- 8:30 pulled out of hole to run casing

- 9:30 start running casing

- 11:00 - last of 4 lengths 13 $\frac{3}{8}$ " casing in.

- 12:00 finished cement - 130 sacks.

June 26 ~ Thurs

W.O.C. - refined brakes, etc

Mixed pit Zoogel

June 27 ~ Fri ~ 7AM - 4PM L-24

Drilling thru 40' cement

10:11 AM - 20' of cement at 46'

12:25 PM - lost circulation 430'

shut down to add Fibardex, sandust and red wood

12:45 - drill to 450' - circulation returns

- irregular - gone again 475' - back

in 2-3 minutes but volume low

(200-300) - 30' to 480' - saving 500-508 - worked longer (2)

Notes on Cuttings - E-1

10-20 Cream-colored sand made up chiefly of more or less worn beach type forams (Elphidium, many with spines or spine bases, Marginopora and others). Hamulinella fragments, red spines and some large pieces rounded coral - worn plates Halimeda.

20-30 Very silty sand to silt with frag + occasional moll. shells, many spiny Calappa and worn coral frags up to 2 1/4" - Halimeda rare.

30-35 Mostly fresh segments of Halimeda + many Calappa, bryozoans, frag corals, moll. (small) - some coral + some moll. well preserved.

35-40 Same as last - Halimeda debris.

40-45 Same as 30-35.

45-50 ^{and algae} Rounded coral gravel and worn frag. shells, some fragments well cemented as compared to forams and other debris; few pieces unincemented; few Hamulinella; worn frag. large red spines; many of coral fragments are freshly broken and apparently are from larger blocks broken by drill; Halimeda ^{many worn} ~~unincemented~~ beach gravel; some frag. beach sand; Calappa abundant in fine sand - mostly badly worn.

50-60 Similar to last - many moll. - some good size, but little or no shell - many worn Calappa legs. (see p. 7)

at 11:55, shut down to clean and
prime pumps - clogged by fast-sink
material

4/22 - 1 PM - midnight - Inge
Hull lower at 1155 - To 1165
Circulation lost at 1165.

6/28/51 Sat. Midnight - 8:00 Russell.

12 M. Building up mud and
lost circulation materials

1:00 P.M. 2nd circulation
material failed pumps
shut down to repair

⇒ 1167 - 1174 - open casing

2:25 P.M. Pump unable to
deliver even 100 lbs pressure.
Pump repaired - rubber
piston heads are bad.
Plans to shut down to
repair as soon as mud pit
are completed.

3:25 P.M. Depth 1207.

- Sent for Sanyo pump
to start pump repair.

3.45 AM.

Rubber washers on pump
pistons completely shot.
This explains all previous
troubles of last ~~few~~ days.

6.25. Water pump, cooked
out. Now need a waiting
for pits to fill. Will
drill with sea water
from here on down to
next casing (unless
ordered to mix another
batch of mud by someone
else).

6.45 - Drilled to 1207.

But refused to drill
down. Buck's lady.

Dubley thinks a lost
steel pin from rotary
table may be at bottom
of hole.

June 28 - Sat. ~ 8 AM - 4 PM - Radl

(sample in
sammel bag)

From 1207
- coming out of hole, to see bit
- bit with piece hard to stick in
center, seems frozen, shows some wear
but not too dulling on bit. put on

new bit. Behavior of bit evidently due
to piece rock lodged between cones.

Full - start back in hole. Mud supply ran
down to 16± bags; will have to go
ahead with sea water; arranging for
another salt water line to keep pits
full.

25 min. (from 12:25 hrs.)

- 45' savings in hole.

- back to hard layer 1207 - drilled very
hard for 2 in. (15-20,000 lbs on bit); still
hard below (20,000 lbs)

- 9:30 hrs. drilled 4 ft (1222 ft) - still hard -
pulled up string, the mud still down to
refill pits, water in pits.

- 11:05 drilled into soft for material at 1211½

- 11:55 down to 1228 ft; pull up 2 stands and
work in water - lost 8' (1220 - 1228) in 7
minutes.

- 2 PM - drilled 1230 - 1240' in 24 min
(23 min for first 5', 1 min for last 5') - int.
1235-40 not cavity, not rough - just soft.

- 1240 - 45 soft } 15 min,
- 1245 - 50 firm }

- 2:30 ± pulled up - to refill pits; 3rd water
line installed.

Notes on cuttings - cont.

- 100-110 Very low percent abundance - these like last of Calcareous comp. few in fine fractions. Pora with last
- 110-120 Similar to last 2 intervals but with higher % broken coral; well pres. moll. frags. and a few test.; Haliotis frag. few; moll. molds, much yellow calcite
- 120-130 Fine cuttings - no essential change; frag. of coral moll. shells and crustaceae
- 130-145 Fine like last, yellow calcite (incl. moll. molds) abundant; Haliotis only in fragments
- Interval 15
- 146-150 Coarse - generally mostly above $\frac{1}{4}$ " (up to 1"), many are rounded pebbles of worn coral, others recryst. yellow calcite - dense except for thin spaces representing organic molds (even back of this sample contains practically no fines - samples from this interval taken after drilling out - around surface casing and may not be good - some cuttings not washed out after washing? - see also next 1 met. below - this sample prob. OK.
- 150-160 Procs larger than $\frac{1}{4}$ " mostly ^{angular frags.} recryst. yellow ls. - largest pieces $\frac{1}{4}$ "

June 28 - Sat. - 4 p.m. - 12 p.m. Ingersoll.

4:15 10' firm layer at 1250-1260'

4:25 new length of drill stem; 1st
10' much softer

4:50 found 30 min in 25 min.

4:52 new section started down, 2' 1"
down; first 15 ft 35 min 30 ft.

5:30 stop drilling to let pits
fill with water.
Start 1 ft. softer (driller) 1330 ft.

6:02 start drilling again (30 min).

6:25 another length; took almost 1 hr,
most of it on 1st 20 ft.

7:25 - 7:55 fill tanks again.

7:55 + another length; down in
just over 10 min.

7:55 - 8:38 entertained visitors
from B & N, but drilling
proceeded nicely 1470' at 8:38

9:56 at 1542' time out to
accumulate water.

10:15 Packed 200' of pipe out of
hole, to keep drill from
getting stuck during delay.

Jan 10 Sunday. Midnight - 1:00 AM. Cancelled.

12:30. ~~Jan~~ Still at 1592.

We unable to make any
connection because of
accumulation of mud at
bottom of hole. We are
preparing for a much longer
run to make.

3:00 Still at 1592.

Took pump & explained why
cannot be repaired. Told of
to keep trying to go ahead
with no luck.

We are now in the hole
as possible to get to bottom
of hole to start drilling but
as soon as bits set low
driller has to pull back
a few strokes to keep bit
from sticking while waiting
for the pipe to fall. This
process of substituting permits
continues to accumulate again.
As soon as bits are filled
most of water is used.

Chasing out nothing having
little or none for actual
drilling.

Solution: get enough
pumps to keep up with
filling pits to keep up
with block pump which
would make it necessary
to shut down long enough
for things to accumulate.

When finished

4.45. Reached bottom - start drilling

5.35 A.M. Drilled to 1709

before water supply ran out.

Pulled up about 100 ft

& waiting for pits to fill.

Get water supply

7.00 A.M. Starting back

to bottom. Pits full.

June 29 - Sun. - 8 AM - 4 PM - Laid

1710 - 20 - 3 min

1720 - 30 - 3 "

1730 - 40 - 2 "

1740 - 50 - 3 "

1750 - 60 - 3 "

1760 - 70 - 2 "

1770 - 80 - 2 "

1780 - 90 - 4 "

8:45

1780 - 1800 - 3 min

1800 - 1810 - 4 "

1810 - 1820 - 3 "

available for 20 min - down side

in setting up third pump

1820 - 1830 - 4 min

1830 - 1840 - 4 "

1840 - 1850 - 3 "

1850 - 1860 - 2 "

1860 - 1870 - 2 "

1870 - 1880 - 2 "

1880 - 1890 - 2 "

1890 - 1900 - 3 "

1900 - 1910 - 3 "

1910 - 1920 - 4 "

1920 - 1930 - 2 "

1930 - 1940 - 2 "

1940 - 1950 - 3 "

1950 - 1960 - 2 "

1960 - 1970 - 1 "

1970 - 1980 - 1 "

1980 - 1990 - 2 "

1990 - 2000 - 2 - small bumpy zone

Decided to case hole at 2000' (limit of our 9 5/8" casing) even though no casing seat found. Only other course would be to continue drilling with 8 3/4" beyond 2000' in search of casing seat for 7" pipe. This

is undesirable because (1) it would increase the interval from which we have no samples, (2) after setting 2" we would not be in a position to case off deeper soft or cavernous sections.

Section in E-1 differs radically from that in F-1. Only cavity in E-1 is at 1157-74 - all of numerous cavities of F-1 are below this level (first about 1250; last about 2775); section drilled today - 1700 - 2000 is all soft - whereas there are many hard and firm beds in this interval in F-1. It will take fossils to tie these two holes together. Plan to take core as soon as casing is set.

Checked with Mr. Carey of H-M to be sure there was no 9 5/8" pipe available locally to enable us to go deeper for casing sect. There is no 9 5/8" nor any amt. of larger pipe that would enable us to extend our 2000' string - nor is there equipment capable of pulling pipe from F-1.

Took TOTCO reading at 2,000 - $\frac{1}{2}^{\circ}$
Cut at hole to a fresh reaming bit
(7 3/4" at bottom + 1 1/4" at sides).
- start reaming at 10 PM - bit onelly to
remove cement inside surface casing.

21/10 PM - shut down to repair chylol

Hoisting early - only 1-2,000 lbs on
bet. At 7:15 AM down to 780' - graduate
while shift is changed.

Note

from reaming operation & therefore
contaminated more than ordinary.
All are fine due to thickness of mud;
were caught in a gal bucket at
in similar circumstances in F-1.

4 PM - June 30 To 8 AM July 1
Ingerson - Russell.

6.25 AM.

Reaming continuously.
No serious interruptions
(one or minute repair job
on pump) since 4 PM.

Reaming completed at 6 AM
to 2000 ft. Payne said
hole apparently had been
drilled with rock bit only
to 1998 for the last 2
feet went very slowly yet
there was no change in
character of cuttings.

Although some mud was
lost one pump supplying
water was sufficient to
maintain volume up to very
near land when another
pump was thrown to.

~~the~~ Mud seriously up

E-1

Samples to Cole

Notes on Core #1 - 2003 - 2028

Core consists of 4 oriented pieces (longest = 1 ft. in plastic tube; other 3 tubes 1 ft.), rest of core small, more or less rounded pieces.

Rock is a weakly cemented mass of mollusk shells (Cardium and other bivalves), red like algae, and small Foraminifera. Corals are rare (one large colony Porites, apparently in position of growth). Gast also rare and no larger Foraminifera were recognized. Rock looks like near-shore lagoon deposit, no molds seen.

(154)

Maintained well and
circulation remained good
all way down.
at end of running operation

maintained well crest
circulation remained good
all way down.

At end of steaming operation
all bunch up to getting
a full pit of high viscosity
sludge, preparing to circulating
in planned pipe for one
hour & a half before cutting
string.

July 1 - Tues

Run 2000' of 9 5/8" casing and
cemented with 145 sacks.

July 2 - Wed - NOC.

July 3 - Thurs - Noon - midnight - Rain

- 1 PM drilled thru gravel - to 2003

- mix mud and clean out hole

- out of hole 5:30, preparing to core

- shut down to work on wire off

- 6:30 PM on bottom with diamond core bit

- Cored 25' (2003-2028) in 7 min. - with

low pump pressure

- Recovered 4'6" (=18%) - preserved lost

1' in plastic tube for porosity tests.

- Much of core appears to be sand
and fragmentary shell - one large
colony Porites - see above.

Core
#1
Spec A+B
to Coker
2003-28

Notes on Cuttings (cont.)

160-170 Brown coral fragments like last - in some cases, at least, yellow calcite replaces orig. coral skeleton, giving casts. No fine facies in fine fragments but some beach type appear to be solid yel calcite, preserving some surface sculpture.

170-180 same yellow calcite ls

180-190 Similar to last; brown calcareous coral in fine fragments (isopachous?) - have dark brown color as against pale yellow of calcite. Amphistegina? - some more 190-195

195-200 Same - some spec. coral septa perfectly replaced by yellow calcite

200-210 Yellow white ls from above 200 pieces of a friable white ls with numerous moll. (a frag) with original shell and some tan to brown ls with moll. but not having these two types - the white friable and the dense brown may be same - The latter derived from the former by deg. of white & possibly recryst. Finer grades have good moll.

- 210-220 Similar to last; finer grades same.
- 220-230 Coral ls - with yellow calcite.
- 230-240 Similar; some of coral ^{with} well preserved surface detail; abundant white debris with good mollusks (frag. large bivalve, Arca etc.); pieces of tan to brown dense ls. with microfossils.
Yellow calcite & dark brown dense ls. pred. at local spots in friable, white, coral + shell ls.
- 240-250 Like last - good Mytilus, Tellina, Arca, etc. - moll. molds rare.
- 250-260 Coral + shell ls - many pieces branching coral 1/2" diameter; some coral partially preserved; yellow calcite in few pieces.
- 260-270 Similar - same with plus coral some friable sand and shell; most of corals (< 1/2") fragments is coral & shell not numerous.
- 270-280 - No change.
- 280-290 - Similar but less coral, more plus calcite, int. mold of bivalve - some good moll. - well preserved coral.
- 290-300 Similar coral and shell ls. with parts of Mytilus.

fine detritus in dense matrix of yellow
calcite; other parts of matrix white and
friable - many and varied mollusks - small Platys,
large Turbo aperturum. Largest corals
fragment $1\frac{3}{4}$ " Few Haliotis, corals and molls

300-310 Porous white coral and yellow calcite coral;
- some small, Strophomena Strophomena

310-320 Coarse molds in yellow calcite matrix, much
of it coarsely crystalline, with few, small
other internal molds

320-330 mostly coarse (to 4"), porous white and
dense yellow calcite, coral in shell ls;
practically no fine texture (molds thin);
few small molds

330-340 Buff ls with small molds, yellow calcite - some
small with shells in lines

340-350 Buff ls ^{not hard} - with yellow calcite + ^{numerous} small molds,
few small fossils with shell fragments in lines

350-360 } No important change

360-370

370-380

380-390

390-400

400-410

410-420

420-440 - no sample

(see p 25)

(78)

710 start back on hole

July 4 - Fri. 11 PM - 8 AM. Russell -

5.53 AM. Drilled To
2500 feet. Losses
must steadily get
circulation good
and sample plentiful.
(2028 - 2500)!

July 4 - Fri. - 8 AM - 4 PM - Russell

- 2580 - 2745 - mostly firm
- shut down to work on rotary clutch
- On to 2802 - shut down 11:50 AM
for minor repairs and to run core
bit - Total at 2802 = $\frac{1}{2}$ "
1:50 PM into hole with core bit.
4 PM start coring
- Core 6"

Repl ONR →

July 4 Fri 4 PM - Midnight - Smith

	4:30	Box	End	Act.
From 2802 to 2803	3:31	331 $\frac{1}{2}$	$\frac{1}{2}$	
	4	345 $\frac{1}{2}$	347 $\frac{1}{2}$	2
	5		351 $\frac{1}{2}$	4
	6		354 $\frac{1}{2}$	3
	7		357 $\frac{1}{2}$	3
	8		401	3 $\frac{1}{2}$

E-1

Samples to Cole

20a

ID to Cole

15 min spent drilling last ft.
Driller presumes hard rock
encountered (but wrong by 30)

C+D to Cok
CORE #2
2502-
2808

15 min. spent drilling last ft.
Driller presumes hard rock
encountered (but wrong, 30)
Recovery 100%
Core firm to hard, cavernous ls.
Core packed in cbl at 6 1/2', unable
to continue coring.

2808' - Tan ls, many melt molds - no
larger features seen, but 2 spec. touched.
(Note: During coring it was
thought that a clay hard
rock had been encountered
which was slowing & halting
the coring bit. Once the core
was recovered and ^{very hard} material
found (although recovery
was 100% & another explanation
seemed more reasonable). The
core was tightly packed & wedged
in the barrel because of a firm
coating of ~~ls~~ thick dulling
mud mixed with hard cementation
material. Now tightly packed
this was becoming evident
when it was found that
penetrating the barrel was
insufficient to remove the core
and that it had to be removed
free with steel rods.
Probably the core became wedged

in so tight that no additional material could enter the barrel during coring and thus the pit merely rotated the barrel being held ~~up~~ up by a cushion of ground up rock unable to enter barrel.

I would agree, if this were true, that it should be necessary to make sure that the mud is not too thick or have too much lost circulation material in it before attempting to core. However it should be noted that the tight packing of mud was probably responsible for holding in all the soft core which was recovered and that if it were not for this the ~~very~~ percentage recovery would probably have been very low - even though it could have been 25 feet instead of 6.75 feet.)

10:30 PM

Found two feet of hole filled or filled with cuttings on returning to drill.

Drilled July 5. Saturday 12 mid - 7 PM

Reached bottom 12:30 AM.

7. AM. Drilled to 3010 ft.
Circulation good mud
was very slightly samples
plentiful all way from
2808 to 3010.

July 5 - 8 AM - 4 PM Lost

Drilling in from 12 to 3010

- At 3097 shut down to work on slotted
- 1:30 PM - resume drilling
- 2 PM - Lost circulation in rough drilling
material at 3127'
- Pulled into casing to mix mud, etc.

July 5 - 4 PM - 12 mid - 7 PM
" " 12 mid - 8 AM - 7 PM

Attempt to recover circulation
with full pit of mud and lost
circulation material failed
completely. Decided to drill ahead
using new water. (7-11 PM)

Continued from 3127 to about
3360. Also from this time
seems to be generally firm to

Work well - 4 in. stroke quite
harder than 3 in. (for drilling
time record for exact comparison)
Even 3 in. to 3 in. stroke
very satisfactory and fairly fast.
But it is not recommended for
a soft sample to drill very
hard.

July 6 ~ Sunday - 8 AM - 4 PM - Red

- Shut down to service rig and install additional water line.
- 8:30 resume drilling - at 3500' ±
- 7:00 at 3560 - making connections with little difficulty
- 10:00 at 3620 - no trouble making conn.; average time for 10' = 5-6 min. - with 4,000 lb on bit
- 11 AM - hardening up 3730-40 - continues hard thru 3760 (14 min per 10')
- 1:45 down to 3810 - still hard; circulate to let water build up - still hard at 3840
- 2 PM - shut off water
- softer from 3860 - 4050' ±
- stopped 4:40 PM at 4079' - last 30' ± @ rate 4-4½ ^{min.} per 10'
- can get 20' ± in bbl. without making conn. Pull up several stands ^{to} mix mud & come out to core

Notes on cuttings - cont.

440-450 - small sample of fine cuttings - similar to 340-350 except for more moll.

450-460 } - same as 340-350

460-470

470-480 - no sample

480-490 } - same as 340-350

490-500

500-510

510-520

520-530

530-540 - Medium cuttings (about 1/4 screen) mostly coral, much of it well preserved; frag. moll. with orig. shell - with strong - rest. This may be top of Tertiary. Some small forams, crust. frag. & ech. spines in finer gravel. ^{much of coral} slender branches. Same as last.

540-550

550-560

" " " but moll less abundant

560-570 - same as 530-540

570-580

" " " but moll rare & frag.

580-590

" " " "

590-600

Similar to 530-40, more fragments massive coral.

600-610

Same as last

610-620

No change

620-630

Similar to 530-40 but more frag. massive coral and good moll. & small forams

630-640

Like last but moll. even more abundant

640-650

" " - see frag. str. + bus (cf. Bot.)

E-1

Samples to Cole

Run well 620-650 / 670 -

50 corals - some small

-verrids, Hyoscyamus, corallum cones - also moll
in faunas in fine fractions

18.1. 1961 620-650; 650-

Brachiopods, corals, mollusks

-Verrills, Strophomena, Corthis, Corvus - micros. moll.
+ fossils in fine fractures

650-660 Similar - see page. fragments showing
matrix line debris, some yellow color, moll. less abundant.

660-670 Very fine, coarse (1/4") cuttings of coral, moll.
shells mostly frag; micros-moll.

670-680 Same as last

680-690 Like 660-670; 1 pale Millepora; slender
branch corals again abundant; also moll.

690-700 - Like 660-670 - micros. moll.

700-710 " " " " "

710-720 Similar to last; some sample, fine cuttings;
shel. up to frags. Tridacna, Corthis,
fossils & few micros. moll.

720-730 Similar, micros. moll. - abundant } some

730-740 " " " " } some

740-750 " " " " } fine cuttings
-brown Margosporus - fragmentary

750-760 similar; good micromoll + forams; small sple, fine cutts.

760-770 " , brown Marginopores, venerids + other small moll.

770-780 Similar; brown Marginopores more abundant

780-790 " " " 1525

790-800 " small brown Marginopores abundant
good micromoll

800-810 Small sample of fine cuttings, coral and shells
(good micromoll + frags larger forams; few
brown Marginopores) rather brown foam + variety
of white tests

810-820 Same as last + frag. ech. tests + vast Halimeda
- most of mat. passes 20 mesh.

820-830 Same as 810-820 -

830-840 Large sample; corals + excellent moll. (not
shells etc.) much white + Ediacara, etc.,
^{shells} ~~corals~~, + great variety micromoll

840-850 Like last - not too many forams, corals + shells
- one frag. (quite ?)

850-860 Warm coral + shells - some frags - fine forams
fragments material - chms

(see p 31)

(27)

July 7 Mon. 8 AM - 4 PM

11.30 AM. Started down with core barrel.

2.00 PM. On bottom. Heard a start coming because water will not pump through pipe even with 1000 yards pressure.

This is a dry run. Starting back out of hole to remove ~~water~~ whatever is plugging core barrel. Then we will advance part of trouble we core barrel and pipe went down to bottom with no obstruction or delay in coming down.

5.45 PM.

Core barrel full. Found no plug. With last attempt to pull it, core barrel cut & started back up hole by 6.15 PM.

Total 4078' = 10

July 7 ~ Mon. ~ 8 AM - 4 PM Ladd

Ran core bbl. - 4078 - 4100'

Loss of water (1-2-4-3).

Out with core at noon, recovering

4078-
4100

13' out of 22" (=60%) - hard white coralliferous ls. Time log shows several soft layers which probably represent the 40% not recovered.

Two sections of the core sealed promptly in plastic tubes in sea water. One of these is 7" piece the bottom of which lay 5' above bottom of core; other piece 5 1/2" in length, its base 6" above bottom of core (spots from which these samples were taken are filled with wooden blocks in core box 10)

Mixing mud at end of shift. To reach the 22' core and continue drilling with 8 3/4 rock bit until satisfactory casing seat is found - then run 7" pipe + cement.

July 7 - Mon - 4 PM - 12 midn. SMITH

continued mixing mud

7:15 started recording for shift

7:35 drilling

	2nd	End	Actual
4:18	7:34	7:42	8

- 40 4120

- mixed second pit mud + prepared to run 7" casing

{ 5/8" casing
9 5/8" 1999 }

July 8 ~ Tues 8AM - 4PM ~ Ludd

Ran 7" casing with float shoe and float collar. Ran liner hanger to bottom of 9 5/8" casing @ 1962-63 from Rotary bushing. Circulated for 30 min, then cemented 7" casing with 100 sacks cement; displaced cement with water, backed setting tool out of liner hanger & collapsed packer

7" casing in hole 2140.37'
Liner ————— 6.50'
Shoe set at ————— 4108.50'

July 9 ~ Wed ~ WOC

July 10 ~ Thurs ~ 8AM - 4PM Ludd

Wired 2 packets Fluorescein (from life jackets) on bottom of 6 1/4" rock bit; all small drill pipe into hole at end shift

4PM - midnight - Stephenson

Bottom depth - 3992' - 128' cement (see p. 32) (30)

- 860-870 Similar; excellent moll.; no lignitic material
- 870-880 - Worn & broken coral & moll. + ^{soft, gray} lig. clay. - a relatively
very shallow water deposit - barnacles & plates
- 880-890 Worn shells like last (C₂), with coral (pitted),
ls. rubble - brown & gray, rare & one small
pitted ls. (pitted clay); little if any fresh
coral; worn frag. crabs, ech. tests, small
shelled mollusks (pitted moll. prob.)
- 890-900 Broken coral & shell, with few chips; gray, dense
ls., no clay and only one small chip, lignitic.
- 900-910 Fine gray fine grained (C₂ or A₂) little
coral, thin gray dense ls. - Small sample.
- 910-920 Similar to last, moll. more numerous
- 920-930 } Similar to 890-900; no lignitic clay. Small
930-940 } sample, few cuttings.
940-950 - pitted sub. (moll.?)
950-960 - some good moll. in fine fraction
960-970 - " " (C₂ or A₂) + much moll.
in finest fraction - see separate study of
970-980 - pot clay (prob. looking mud)
- 980-990
- 990-1000

July 10 4 PM - Midnight - Stephens (cont.)
(from p. 30)

Dye run -

6:26:45 - End of dye run
5:36:32 - Start " " "

50:13" - Circulation time.

Pump - 30 strokes/min.
700 lb. pressure
18" Pump - 6 1/4" liner

7:30 - Down to 4108; lost some
mud; shut down to build up
mud. (7' casing 15' off bottom)

9:15 - Drilling started. Circulation
seems ok

10:20 - Depth 4152' Lost circulation
Last several feet were hard
drilling. Not enough time for
return of cuttings, so no samples.

11:00 - Depth 4170' Circulation
returned.

11:30 - Circulation weak, then

E-1

Samples to Cole

4160

4190 - lost

4208

lost after adding drill stem, lost
mud brought up few black particles.

lost after adding drill stem, lost
mud brought up few black particles.
Depth 4190.

11:45 - Depth 4190. Drilling hard.

July 11 Midnight - 8:AM Smith

12:00 - Depth 4200. Drilling
very hard. No circulation

4190 - 4200	11:37 - 12:	23
- 4205	(5' in	40 min)
4200 - 4208	12:00 - 1:11	71

The black particles do not
react to acid - not carbonate

Looks like hard rock under
microscope, fine grain, xtaline,
black. Prob. BASALT

4:00 bit shows considerable wear,
teeth smashed.

4:15 Assemble core bbl
3 1/2" < core

6:30 core bbl held up
on 4150-4160 level

drilling slowly.

Driller saw cutting through
boulder which fell across
hole. 4 min.

Cave #4

4209 6:55-7:10 12

4210 7:10

July 11

~ Friday 8AM - 4PM ~ (Sat.)

84

Finished 3 ft core run (4208-4211)
at 7:30 PM 32 min. (12-10-10).

Cave

4208

4211

9:30 out with one bag, fresh
black basalt

Recovered 2' 11" (=97%)

- 8 pieces - all fit together
- one 8-inch piece from middle
preserved in sea water in
plastic tube (top this piece
10 1/2" from top of core)

- Diamond bit badly worn on sides

The basalt appears hard
and fresh at first glance, but
closer inspection shows that
there is much chlorite,
especially along fractures
and shattering pyroxene
and olivine grains and
clusters.

Notes on
core -

Ingerman

The olivine has the typical glassy luster and conchoidal fracture. Its color is yellowish to brownish depending on the size and compaction of the grains. - smaller and more fractured grains showing lighter colors.

The olivine grains cannot be tested readily for hardness. Because of their fractured character and the brittle shattering they appear to be much softer than a needle of ferrous pyrite. On one large one, however, a needle point was broken. There can be little doubt that these grains are olivine.

The rock, therefore, is an olivine basalt. It does not contain nearly enough olivine, however, to be called an oceanite or picritic basalt.

The rock is well
pegned with calcite
veinlets. In the first 3' ^{of}
core there are typical of
these ranging from almost
vertical to the core
axis to angles of almost
45°. One small cross-
cutting veinlet connecting
two of the flat ones is
almost parallel to the
axis of the core. It is
3" long and from 0.7 to
2.0 mm. thick.

Some of the veinlets
contain enough chlorite
to color the calcite a
light green, and in
some of the thicker
ones there are alternate
layers of calcite and
chlorite and/or highly
chloritized, slices of rock.
The calcite veinlets in
the first 3 ft. core are
1.0 to 14 mm. in
thickness and are separated
by distances of from
one to eight inches.

Core #5
4211-16

Into hole with 6 1/2" rods bit -
no outcrops - clean hole - moved
to 4211. 1712 put mud prior
to taking another core
Obtained small return when mud was
pumped in.

7/12/52 - South

2:00 AM Cored 5' 3" Hard basalt
depth 4211 - 4216" 100% Recovery
one 7 1/2' piece (top of piece 2'
from top of core) preserved in
sea water in plastic tube

July 12 - 8 AM - 1807 - Full

6:30 running out of hole with last
core

Core #6
4216-22

9:45 - Recovering 5' 10" = 97% of
basalt - one 8" piece sealed
in plastic tube - top of this
piece is 1' 8" below top of core

Notes on Core 5 + 6 (E.I. 7/12/52)

Core no. 5 is very much like no. 4 for the first 4 feet; in spacing, orientation, and thickness of calcite veins; in olivine content; and in proportion of massive material.

The lowermost foot of core no. 5, however, is much more highly veined and fractured than is the (basaltic) material above it. It is so highly fractured that the orientation of only a few of the larger pieces could be determined with certainty and so highly altered that only a small amount of olivine could be spotted with a hand lens.

Cole No. 6 is somewhat more highly fractured and veined than is No. 5, but there is no marked change in trend downward.

Relatively massive sections continue to alternate with badly fractured zones. In No. 6 there is one calcite vein almost an inch thick (2.5 cm.).

The material at the bottom of Cole No. 6 appears to be more highly altered than is material about as massive and similarly veined higher in the cores. It is very difficult to find olivine with a good lens in the piece from the bottom of the hole.

There are no obvious breaks, changes in lithology or vascularity that would indicate that more than a

single flow has been
pierced.

As indicated above,
there is no pronounced
or continuous change
with depth over the
interest core (ca. 14 ft).
Prediction of the character
of the material still
farther down is less
certain. A careful
study of the core is
yet to give the im-
pression that the
same type of material-
alternating zones of
massive and veined
and fractured material -
probably continues to
a considerable depth
(at least some
hundreds of feet?).

